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Specification and Drawings, as originally filed, with Application for Patent Serial
No: **2,393,866**, on July 17, 2002, by **CANIMEX INC.**, assignee of Normand Savard,
for "Integrated Bracket Ratchet System".

L. Régimbald
Agent certificateur / Certifying Officer

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Date

Canada

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INTEGRATED BRACKET RATCHET SYSTEM

Field of the Invention:

5 The present invention relates to a ratchet system. More particularly, the present invention relates to an integrated bracket ratchet system, said ratchet system enabling to ease the installation and calibration of counterbalancing mechanisms of mini-warehouse doors, commercial rolling steel doors and the like, but being
10 able to be used also with any other type of counterbalancing installation where a torque must be applied and maintained onto a shaft.

Background of the Invention:

15 It is known in the art that most garage doors currently used are counterbalanced by different suitable means. Some doors are counterbalanced by means of a counterweight and other doors are counterbalanced by means of an energy-storing device, such as a spring under traction or torsion for example. These counterbalancing systems are typically used to ease the force required by a user or a motorized door system to raise and lower the door. In order to put a spring
20 under tension, an installer typically must wind the spring and maintain a given torque or tension in the spring by different methods and apparatuses. Actually, some systems employ a U-bolt or a special bracket which are tightened and maintained in place when the spring is under tension. Some other systems use a gear with arm which act as a ratchet.

25 It is also known in the art that the shaft around which the door is wrapped usually rests on a bearing, generally seated in a plug (or "anchor") which maintains and holds the spring. Usually, this bearing must be installed on site and this is often a problem for the installer because the spring is under tension. To ease installation,
30 the spring may be installed at manufacture but in such cases, the plug (or anchor) must be installed under tension and kept as such during transportation.

It is also known in the art that very often, the counterbalancing mechanisms of the
aforementioned type of installations will often use unidirectional or "one-way"
bearings. Similarly to regular bearings, unidirectional bearings comprise an inner
5 ring which is slidably rotatable within an outer ring, the outer ring being
concentrically mounted about the inner ring, the inner and outer rings being
slidably movable with respect to another by means of bearings positioned
between both rings. Unidirectional bearings are generally designed so as to have
an inner portion of the outer ring provided with appropriately shaped grooves so
10 that when the inner ring is rotated along one direction, there is a relative
movement between the inner and outer rings, whereas when the inner ring is
rotated along the opposite direction, then the bearings of the bearing are blocked
by the corresponding grooves of the outer ring, thereby blocking relative
movement between the inner ring and the outer ring. It is also known in the art
15 that these unidirectional bearings are quite elaborate and costly to manufacture,
and also are fairly difficult to install, replace, maintain, adjust and/or repair on
counterbalancing mechanisms which are under tension. Indeed, this results in
additional assembling steps and components required, which is disadvantageous.

20 Hence, in light of the aforementioned, there is a need for an improved ratchet
system which, by virtue of its design and components, would be able to overcome
some of the aforementioned problems.

Summary of the Invention:

25

The object of the present invention is to provide an improved ratchet system, also
known as a "winding system", which satisfies some of the above-mentioned
needs and which is thus an improvement over the ratchet systems known in the
prior art.

30

In accordance with the present invention, the above object is achieved, as will be easily understood, with a ratchet system such as the one briefly described herein and such as the one exemplified in the accompanying drawings.

- 5 According to another aspect of the invention, there is also provided the counterbalancing mechanism provided with the above-mentioned ratchet system.

According to yet another aspect of the invention, there is also provided the garage door provided with the above-mentioned counterbalancing mechanism.

10

The objects, advantages and other features of the present invention will become more apparent upon reading of the following non-restrictive description of a preferred embodiment thereof, given for the purpose of exemplification only with reference to the accompanying drawings.

15

Brief description of the drawings:

- Figure 1 is an exploded view of some of the components of the ratchet system according to the preferred embodiment of the invention, the ratchet system being shown with a shaft of a counterbalancing mechanism.

20

Figure 2 is a perspective view of the ratchet system shown in Figure 1, the ratchet system being shown now in an assembled configuration and cooperating with a shaft of a counterbalancing mechanism in a locked position.

25

Figure 3 is a partial front plan view of what is shown in Figure 2.

- Figure 4 is a perspective view of the ratchet system shown in Figure 1, the ratchet system being shown now in an assembled configuration and cooperating with a shaft of a counterbalancing mechanism in an unlocked position.

30

Figure 5 is a partial front plan view of what is shown in Figure 4.

Detailed description of a preferred embodiment of the invention:

5 In the following description, the same numerical references refer to similar elements. The embodiments shown in the figures are preferred.

Moreover, although the present invention was primarily designed for use with winding systems of mini-warehouse doors and commercial rolling steel doors, it may be used with other types of doors and objects and in other fields, as
10 apparent to a person skilled in the art. For this reason, expressions such as "mini", "warehouse", "rolling", etc. used herein should not be taken as to limit the scope of the present invention and includes all other kinds of doors or items with which the present invention could be used and may be useful.

15 Moreover, in the context of the present invention, the expressions "winding system", "ratchet system", and any other equivalent expression known in the art will be used interchangeably. Furthermore, the same applies for any other mutually equivalent expressions, such as "rollers" and "pins", as well as "blocking" and "ratchet" for example, as also apparent to a person skilled in the
20 art.

In addition, although the preferred embodiment of the present invention as illustrated in the accompanying drawings comprises various components and although the preferred embodiment of the ratchet system 1 as shown consists of
25 certain geometrical configurations as explained and illustrated herein, not all of these components and geometries are essential to the invention and thus should not be taken in their restrictive sense, i.e. should not be taken as to limit the scope of the present invention. It is to be understood, as also apparent to a person skilled in the art, that other suitable components and cooperations
30 thereinbetween, as well as other suitable geometrical configurations may be used for the ratchet system 1 and corresponding parts according to the present

invention, as briefly explained herein, without departing from the scope of the invention.

5 Broadly described, the present invention relates to a ratchet system 1 for use with a counterbalancing mechanism of a garage door, as well as to the counterbalancing mechanism and the garage door associated thereto.

10 As shown in the accompanying drawings, the ratchet system 1 preferably comprises support means 3 for supporting a shaft 5 of the counterbalancing mechanism of the garage door, the shaft 5 being rotatable about the support means 3. The ratchet system 1 preferably also comprises blocking means 7 operable between locked and unlocked positions. In the locked position, the blocking means 7 are operatively connected to the shaft 5 and allow it to rotate along one direction, while blocking its rotation along the opposite direction. In the
15 unlocked position, the blocking means 7 are operatively disconnected from the shaft 5 and allow it to rotate freely in both directions. Preferably also, the ratchet system 1 comprises actuating means 9 for operating the blocking means 7 between the locked and unlocked positions.

20 Preferably, the support means 3 comprise a bracket 11 having a main body provided with a first orifice 13 and a flange 15 provided with a second similar orifice 17, the first and second orifices 13, 17 being positioned preferably opposite to one another, as better shown in Figure 1. The bracket 11 is preferably mounted to a wall by suitable fasteners, such as bolts and the like, as apparent to
25 a person skilled in the art.

Preferably also, the blocking means 7 comprise a guide plate 19 and at least one roller 21. According to the particular embodiment of the invention shown in the accompanying drawings, the ratchet system 1 preferably comprises a guide plate
30 19 and four pairs of rollers 21, each pair of rollers 21 preferably consisting of two rollers 21 connected to one another by means of a pin 23. Each roller 21 is preferably provided to cooperate with a corresponding notch 25 of either the first

or the second orifice 13, 17, as better shown in Figure 1. The rollers 21 are preferably maintained in place by the guide plate 19 by introducing the pins 23 of the pairs of rollers 21 into corresponding holes 27 provided on the guide plate 19. Preferably also, the shaft 5 of the counterbalancing mechanism which is
5 connected to the door by means of a drum is introduced into the corresponding orifices 13, 17 of the bracket 11 and into the corresponding orifice 30 of the guide plate 19. Preferably, the guide plate 19 comprises projections 29 for maintaining the plate 19 in place (i.e. aligned) between the flange 15 and the bracket 11, as apparent to a person skilled in the art.

10

Preferably also, the actuating means 9 comprise a handle 31 provided on the guide plate 19 for actuating the guide plate 19 and corresponding rollers 21 between the locked and unlocked positions, as better shown in Figures 2-3 and 4-5 respectively. Preferably also, a spring 33 having opposite ends connected to
15 the guide plate handle 31 and to a point on the bracket 11 respectively is used for biasing the guide plate 19 into the locked position.

20

In its normal use, as better shown in Figure 2, the shaft 5 which is attached to the door by means of a drum, on which a rolling steel door is pre-installed for example, is placed into the orifices 13, 17 of the bracket 11 and the orifice 30 of the guide plate 19. The bracket 11 is then bolted to the wall. The system 1 can then be operational. The garage door installer will then turn the shaft 5 with a pipe wrench or an appropriate tool and the small rollers 21 will then turn on themselves freely in their corresponding notches 25. When the installer stops
25 turning the shaft 5, this shaft 5 is now under tension due to the torque created by the torsional spring (not shown) of the counterbalancing mechanism of the garage door (not shown). As can be easily understood, under this torque, the shaft 5 wants to turn back to its original position but is then blocked in position by the combined effect produced by the rollers 21 and the particular shape of the orifices 13, 17, i.e. by the friction between the shaft 5 and rollers 21 and by the
30 friction between the rollers 21 and the bracket notches 25, in every shaft position under tension along this direction. Indeed, the ratchet system 1 according to the

present invention, when in the locked position, allows the shaft 5 to turn in one direction but blocks it in the other direction, as can be easily understood by a person skilled in the art.

5 The tension thus created by the torsional spring will be maintained with the ratchet system 1. Furthermore, as also apparent to a person skilled in the art, a user of the ratchet system 1 or a garage door installer may also further turn the shaft along the first direction to further increase the torque. This additional torque created will also be maintained with the ratchet system 1 in the manner explained
10 hereinabove. In contrast, the guide plate 19 is designed to allow to disengage the rollers 21, as shown in Figure 3, and thus reduce the torque on the shaft 5 accordingly. In its normal use, the guide plate 19 is preferably maintained in place (i.e. preferably, the locked position) by the spring 33. Under this position, the guide plate 19 forces rollers 21 in one direction. As long as the shaft 5 turns in the
15 allowable direction, the rollers 21 will turn on themselves, whereas as soon as the shaft 5 is released, the tension on the spring forces the rollers 21 against the notches 25 of the orifices 13, 17 which in turn blocks the shaft's rotation. To decrease the torque on the shaft 5, installer simply has to pull the handle 31 of the guide plate 19 and disengage the rollers 21, the shaft 5 is then free to be
20 unwind with a special tool such a pipe wrench for example. Figures 4 and 5 show this movement, in which handle 31 is pulled and rollers 21 are forced against bigger cavity section of the notches 25 where their special shape move rollers 21 away from the shaft 5. This movement of the guide plate 19 lets the shaft 5 free to turn in both directions.

25

Several modifications can be made to the above-mentioned ratchet system 1, without departing from the scope of the present invention. Indeed, the guide plate 19 and the handle 31 thereof may be placed and designed in a way that gravity will act to replace the effect of the spring 33. The orifice(s) 13, 17 may be
30 integrated in another plate or a single bracket 11 and their shapes may be devised to block the shaft 5 in both directions. Furthermore, the system 1 may be

connected or joined with ordinary bearings, thus eliminating the need for two guid plates.

As may now be appreciated, the present invention is a substantial improvement
5 over the prior art in that by virtue of its design and components, the ratchet
system 1 according to the present invention acts as a unidirectional bearing,
without the use of an inner ring. Indeed, as may now be appreciated, the ratchet
system 1 according to the present invention uses the shaft 5 of the
counterbalancing mechanism as the inner ring. Furthermore, the present
10 invention is also advantageous in that, by virtue of its design and components,
fewer components are required for achieving the same result as with a
unidirectional bearing and thus less material is used, thus resulting in substantial
savings. Moreover, the present invention is also advantageous in that the ratchet
system 1 may be activated or deactivated by simply operating its handle 31. In
15 addition, the present invention is also a substantial improvement over the prior art
in that, by virtue of its design and components, it may act as an adjustment
device in order to trigger or untrigger the rotation of the shaft 5 with respect to the
bracket 11 so as to be able to adjust the tension which is loaded onto the
torsional spring. Hence, in view of the above, it may now be appreciated that the
20 present invention represents an important advantage over previous devices
known in the prior art, in terms of performance and in terms of costs.

Of course, numerous modifications could be made to the above-described
embodiments without departing from the scope of the invention as apparent to a
25 person skilled in the art.

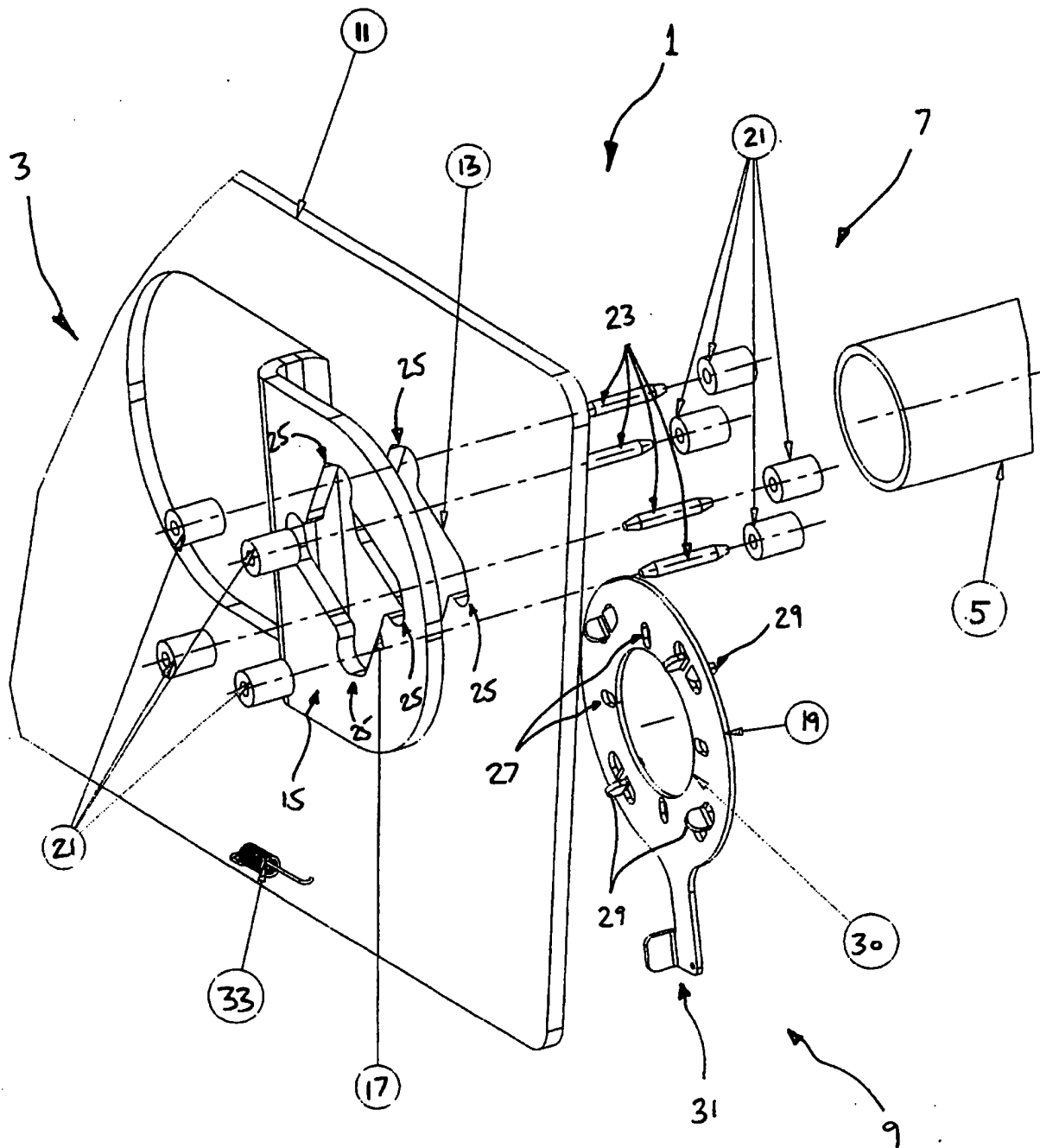
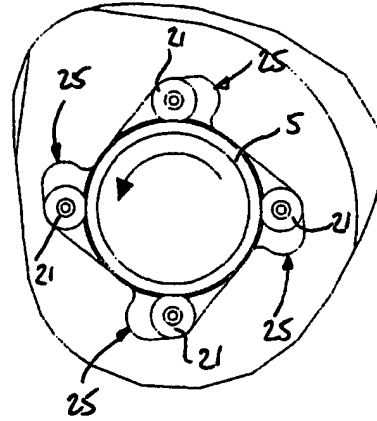
FIG-1

FIG.3



LOCK

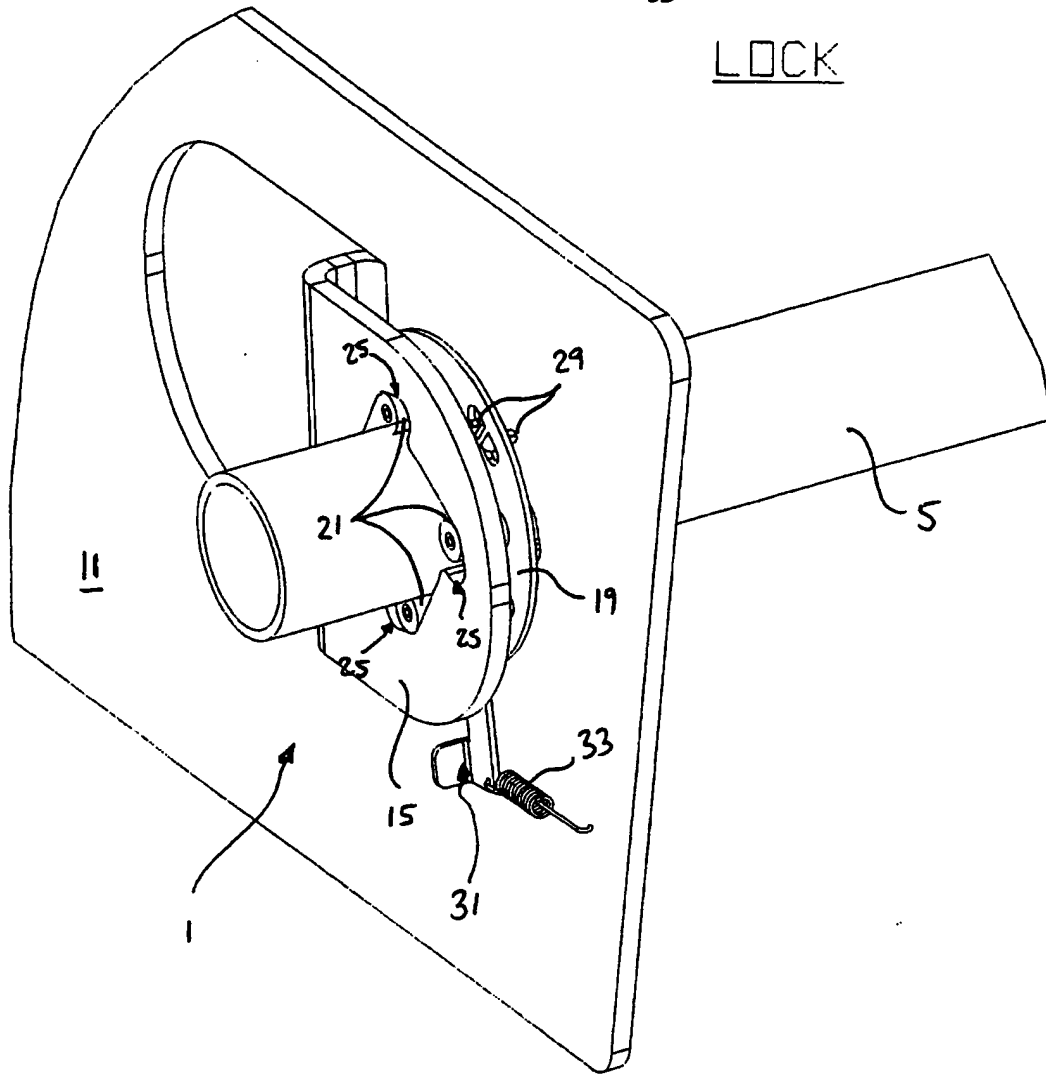
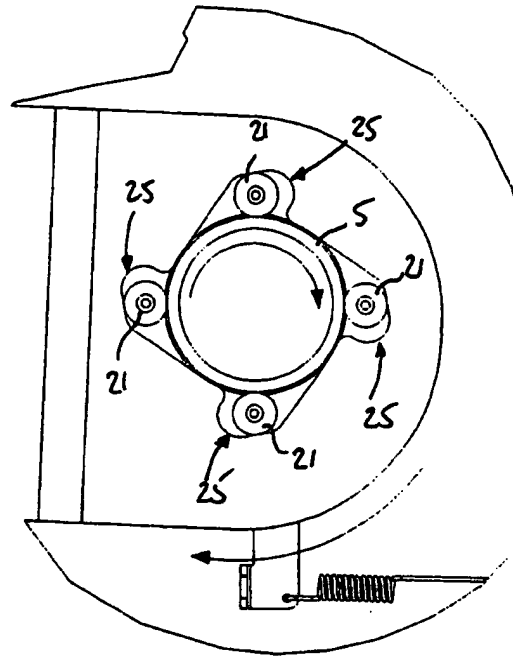


FIG-2

FIG. 5



UNLOCK

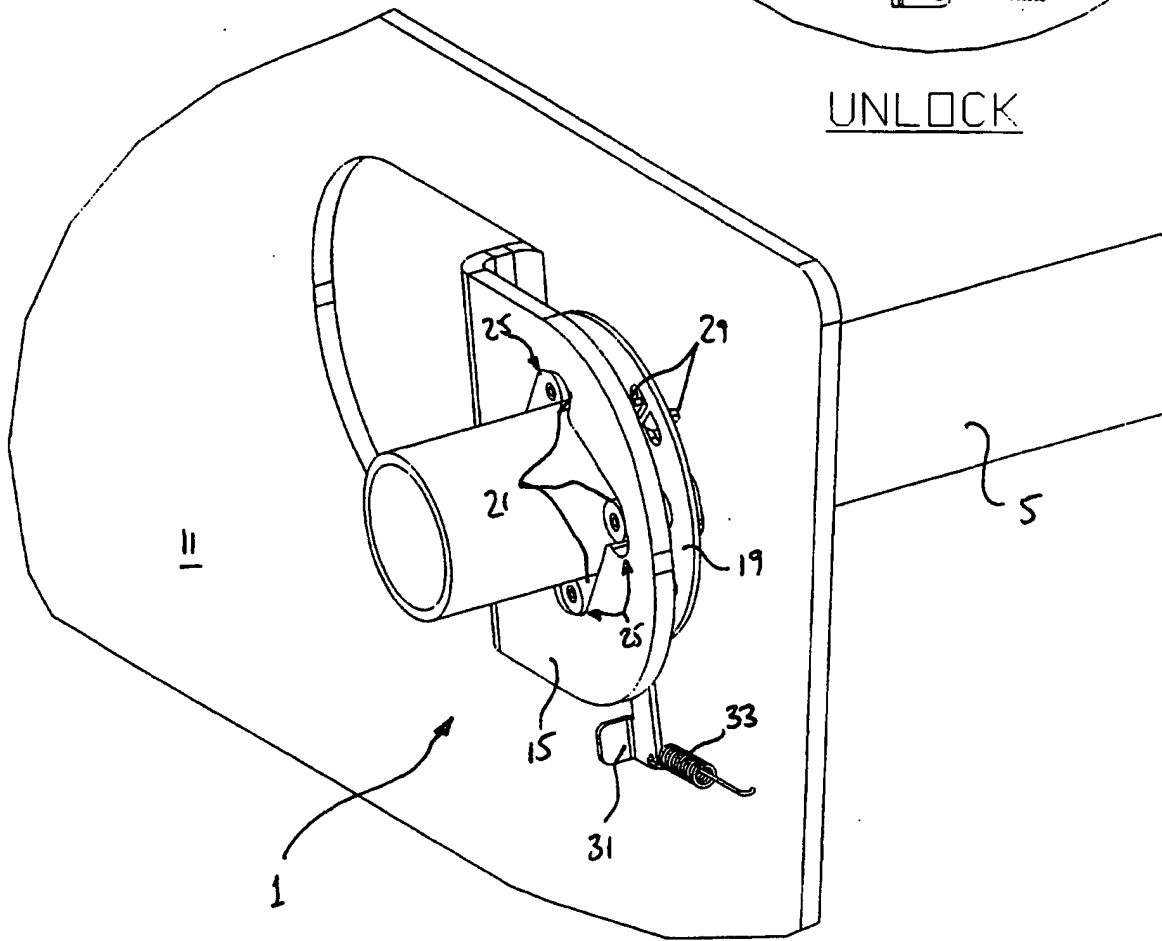


FIG-4